

**BIOLOGICAL NOTES ON *SPARASION* LATREILLE (HYMENOPTERA:  
SCELIONIDAE), AN EGG PARASITOID OF *ATLANTICUS GIBBOSUS*  
SCUDDER (ORTHOPTERA: TETTIGONIIDAE)**

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*Abstract.*—The first behavioral observations for any species of *Sparasion* and the first report of the genus *Atlanticus* (Orthoptera: Tettigoniidae) as a host of *Sparasion* are presented. In Florida, a number of female wasps were observed burrowing headfirst into sandy areas. In every instance where a female burrowed into sand and the area subsequently was excavated, an egg of *Atlanticus*, oriented vertically, was found at 12 to 15 mm beneath the surface. Females emerged headfirst from the sand if they remained underground for more than a few minutes. A single female was excavated from the ground while in the process of ovipositing into an egg; she was at its uppermost end with her head oriented toward the surface.

*Key Words:* Hymenoptera, Scelionidae, *Sparasion*, Tettigoniidae, *Atlanticus gibbosus*, egg, parasitoid

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The genus *Sparasion* Latreille is represented by over 100 species throughout the Holarctic and Oriental regions (Johnson 1992), eight of which occur in America north of Mexico (Muesebeck 1979). Essentially nothing is known about the biology or behavior of these wasps. Kozlov and Kononova (1990) recently described over 50 new species of *Sparasion*, and not a single one had been reared. The paucity of biological or behavioral data for species in this genus is doubly remarkable because it has been recognized for nearly 200 years (described in 1802), and its single known host in the Americas is the Mormon cricket, *Anabrus simplex* Haldeman, an insect of legendary stature in the United States. Surprisingly, even for this common, well-known host, no truly biological or behavioral observations have been published for its parasite, *Sparasion pilosum* Ashmead,

except the host record itself (Cowan 1929) and subsequent citations of this record (Mills 1941, Hitchcock 1942, Wakeland 1959, Muesebeck 1979). Although a few additional papers refer to *Sparasion* in relation to a potential host, these were merely specimens of *Sparasion* collected in a habitat relative to the potential host. For example, Spencer (1958) reported *Sparasion* sp. "probably parasitic upon eggs of the tettigoniid *Anabrus longipes* Caudell," and Thorens (1991) collected *Sparasion* sp. in a locality containing an acridid grasshopper (*Chorthippus* sp.).

In this paper I present anecdotal observations made on the behavior of an undescribed species of *Sparasion* in Florida that attacks eggs of *Atlanticus gibbosus* Scudder (Orthoptera: Tettigoniidae). This is the first report of *Atlanticus* as a host for *Sparasion*. These observations were made in 1974 and

1975 and were to form the basis of more detailed studies to follow. Other obligations prevented further investigation, however, and as no one has published biological information for the genus in the intervening twenty years, my notes provide enough data to highlight significant aspects of the heretofore unknown behavior of a species of *Sparasion*.

#### METHODS

I made observations in two areas about 16 km apart in Alachua County, Florida. In both areas the soil consisted of sand, which in the absence of rain, was loose and powdery dry for the top 1 or 2 cm.

Alachua (0.5 km southeast). This site was a large, sandy, disturbed area formed by the intersection of a railroad track and several dirt roads. The entire area had been bulldozed through a low hillock in recent times, probably as a barrow pit. A number of annual and perennial plants, most notably *Cassia* sp. (Fabaceae), were returning to the site.

Gainesville (grounds of the Florida State Collection of Arthropods, Division of Plant Industry building). This site was an unpaved road that had been cut through the woods around the back side of the DPI building. The site has been paved in the intervening years since observations were first made.

Determination of the status of this *Sparasion* as undescribed was made first by the late C. F. W. Muesebeck and subsequently was confirmed by Lubomir Masner, Agriculture Canada. Additionally, I have compared the species with types and other specimens in the National Museum of Natural History, Smithsonian Institution, and it appears to differ from all available material. Currently no systematist in authority is willing to describe the taxon. All voucher specimens collected in this study are housed in the Florida State Collection of Arthropods, Gainesville, Florida, along with large series of material representing the same taxon.

Field recognition of this species requires experience based upon preserved specimens. The wasps are ca. 5 mm in length, appear black in color, and are most easily seen as they fly or walk back and forth over a small area of soil. Females are distinguished from males by the orange legs (black in males) and short, hidden antennae (elongate and easily seen in males).

Determination of *Atlanticus gibbosus* was made by D. A. Nickle, who compared dried eggs excavated from the Alachua site (21 July 1975) with eggs dissected from dried adult female *Atlanticus* in the collection of the National Museum of Natural History. *Atlanticus gibbosus* is the only common shield-backed grasshopper found in Florida and is particularly abundant during the summer months when my observations were made.

#### OBSERVATIONS

Alachua, 21 to 27 July 1974.—On 21 July I arrived at the site at 10:45 am and saw several female *Sparasion* flying slowly over a small sandy area at about 2 to 5 cm above the surface. Two to 5 wasps were seen walking or flying in any given area (approximately 30 cm<sup>2</sup> to 1 m<sup>2</sup>). Once a female landed on the ground she walked about erratically over the surface with her abdomen bobbing slightly up and down, wings folded and held horizontally over the abdomen. The antennae were extended downward in an inverted V-shaped pattern just above the surface. When a female found an area of interest, she touched her antennae on the sand and vibrated them; then she would plunge headfirst into the sand. As she entered, she rotated her body from side to side, and her antennae appeared to play some role in excavation, but this could not be confirmed. In most cases her body would quickly disappear beneath the surface, and just as quickly she would back out completely and begin the probing activity in nearby areas. Females did not come out headfirst unless they had been underground at least several minutes.

In one instance I saw a female emerging headfirst from the sand. I excavated at the point of emergence and found a tettigoniid egg ca. 6 mm in length at 13 mm below the surface (top of egg at 13 mm). A few minutes later I saw a female wasp burrow headfirst into the sand. It took 40 to 50 seconds for her to completely disappear from sight. Five minutes later she emerged headfirst from the soil. Then almost immediately another female burrowed headfirst into the sand in the same area. After 8 minutes I excavated the soil and found the female near an egg. The top of this egg was 10 mm beneath the surface. The egg was 6 mm in length. Shortly thereafter I saw another female burrow headfirst into the ground and completely disappear in ca. 45 seconds. After waiting 17 minutes for her to emerge, I excavated the sand and found an egg. The female wasp was oriented head upwards, above the tip of the egg, with her ovipositor embedded into it. When I removed the egg, the wasp was still attached to it, but she broke free and flew away. This egg was 12 mm below the surface and was 6 mm long. I placed the above eggs in gelatin capsules, but nothing emerged from them.

On 23 July I visited the same site from 9:30 to 11:30 am and saw numerous males flying above the sand; some alighted on the ground, others alighted on *Cassia*. I did not see any females until 10:15 and observed no digging or mating attempts.

On 25 July I visited the site at 10:30 am. The sand was slightly damp on the surface. I saw males and females cruising the area. In one case I saw 7 females on the ground within a 30 cm<sup>2</sup> area. Some began to burrow into the sand but then stopped. No females entered the ground. Some of the females approached each other, and occasionally one would "hop" at the other (a short jump of 1 to 2 cm). Several times I saw females digging within 5 mm of each other. It began to rain heavily, and the wasps disappeared.

On 27 July I arrived at 11:00 am. A few males were flying over the sand and landing

on *Cassia*. The area was extremely wet, and no females were seen. It rained heavily for the next few days as well, and I abandoned the site.

Gainesville, 2 July 1975.—At 10:45 am, along the edge of a sandy road, I observed a female burrow headfirst into nearly level, loose, dry sand. In 10 minutes a female (presumed to be the same, but perhaps incorrectly, see below) emerged headfirst from the sand about 3 mm from where she entered. Her body was covered with dust, and she spent several minutes cleaning her abdomen and then her head. Then she walked away. I immediately excavated the sand beginning about 10 cm away from the emergence site. I excavated to a depth of 20 mm (the first 15 mm were dry, then became damp). At 15 mm in depth and near where the female emerged, I found two eggs of a tettigoniid a few cm apart. These were about 5 mm in length and placed vertically in the moist sand with the tops at the 15 mm level. I also found three female *Sparasion*, heads upright, near these two eggs but not in contact with them. These females either walked or flew away quickly as the sand fell away from their bodies during my excavation. I brought the eggs into the lab and placed them in gelatin capsules, but nothing emerged.

#### DISCUSSION

During eight days of observations (over a two year period), the number of both male and female wasps seen flying and landing on the sand varied, with up to seven females in a 30 cm<sup>2</sup> area. The absence of observed matings was unusual for such an abundance of individuals, but matings may have taken place earlier or later than the period during which my observations were made (in late morning, ca. 9:30 to 11:30 am).

Females seemed most attracted to areas of dry, friable sand; wet sand appeared to pose a deterrent to initial surface penetration. All observed females entered the sand headfirst. After a female entered the sand

her presence was undetectable from the surface until she either backed out (usually only a few seconds after penetration) or emerged headfirst. It appeared that once a female found a spot beneath the surface that was of interest, presumably because a tettigoniid egg was present, she managed to reverse direction under the sand. Females apparently could detect host eggs from the surface, but they either could not detect other wasp females or these females were not a deterrent.

Although I could not demonstrate by evidence of successful rearing that *Atlantiscus gibbosus* is, in fact, a true host of this *Sparasion*, I believe that the observations point to this conclusion. The constant association of female wasps with *Atlantiscus* eggs and the presence of a female wasp ovipositing into an egg both suggest that this tettigoniid is likely to be a host. Additionally, *Atlantiscus* is a member of the Tettigoniinae, as is the only proven host of *Sparasion* in the Nearctic, the Mormon cricket.

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